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## TEPARY BEAN CROP ECOLOGY, PAPAGO INDIAN RESERVATION, ARIZONA

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Neglected for years, tepary beans (*Phaseolus acutifolius*) are now a subject of interest to: 1) breeders attempting to improve the drought, heat and salt tolerance of widely known bean varieties and 2) agricultural development programs screening low maintenance, short cycle crops for arid lands. Despite this upswing in interest, there is a dearth of information on the cultural practices and selective pressures in the Sonoran Desert region where the bulk of the available tepary bean germ plasm has evolved. To begin to fill this void, we are documenting tepary bean crop ecology in several desert runoff fields of the "Bean People" -- the Papago Indians of Arizona. One of those "water harvesting agro-ecosystems" will be discussed in detail here. A .12 ha. field on silt loam desert alluvium was studied at Little Tucson, Arizona (812 m. elevation). It receives water from a partially cleared catchment area roughly 60 times its size, which is diverted directly onto the field, or into an adjacent reservoir with a capacity of 72,000 liters. This catchment area, of 1% slope and sparse *Prosopis-Gutierrezia* dominated cover, generates the runoff funnelled onto crops in the field. During the 1980 tepary growing period, less than 10 cm of rain fell in the field vicinity; the nearest comparable records indicate that 75 cm of evaporation occurred over the same period.

After a 12 July, 1980 storm which filled the previously dry reservoir, the field was plowed and prepared by an elderly Indian farmer. By 15 July, white tepary beans (Kaplan's T-6 variety, Papago ecotype) and other crops were planted. Teparies had emerged in clumps spaced 90-100 cm apart by 22 July; soil surface temperatures at this time were 43°C in wet spots and 53°C in drier areas. By 25 August, most tepary plants were in flower, and their roots showed *Rhizobia* nodules - Dr. Victoria Marcarian is currently investigating this native strain in the lab. Over half the plants observed had maturing fruit by 4 September. The field was weeded 2-3 times of 5-7 wild species, which, by 16 September, made up less than 5% of the plot's cover, compared to 11% cover by teparies. Less than 75 days after emergence, (by 1 October), all plants were pulled up and left to dry in the field. Final densities were around 100 plants/25 m<sup>2</sup> producing  $11.2 \pm 6.7$  pods/plant (n=30), and  $3.6 \pm 1.1$  bean/pod (n=15). From these yield components, and others cited in Nabhan (1978), an equivalent of 217 kg/ha of teparies were produced. This is roughly 10 times the yield of wild *Phaseolus acutifolius* in natural habitats within 100 km of the field, but only 1/4 - 1/5 of the usual tepary yield in mechanized, irrigated southern Arizona fields (where planting densities of 1175 plants/100 m<sup>2</sup> have been recorded).

#### Reference

Nabhan, G.P. 1978. Tepary bean domestication: ecological and nutritional changes during *Phaseolus acutifolius* evolution. University of Arizona M.S. thesis, Tucson. 141 p.